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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/781,040	02/18/2004	Dmitry Lubomirsky	008266/ECP/ECP/CKIM	8367

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EXAMINER	
VAN, LUAN V	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
12/11/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/781,040	LUBOMIRSKY ET AL.	
	Examiner	Art Unit	
	LUAN V. VAN	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 November 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-6,8-10,12-16,19-24 and 26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 2, 4-6, 8-10, 12-16, 19-24 and 26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Applicant's amendment of November 25, 2008 does not render the application allowable. Claims 1, 2, 4-6, 8-10, 12-16, 19-24 and 26 are pending.

Status of Objections and Rejections

All rejections from the previous office action are maintained.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 2, 4-6, 8-10, 12-16, 19-24, and 26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Independent claims 1, 8, 15 and 23 recites performing the steps in the claims "sequentially," specifically tilting the substrate to substantially horizontal position and then positioning the substrate at a processing angle such that it is parallel to the anode at an angle between about 3-30°. Paragraph 35 of the applicant's specification states

that the substrate is positioned at a tilt angle and then the tilt angle may be returned to horizontal while the substrate continues to be immersed into the plating, and paragraph 36-37 states that the substrate processing angle may be in parallel to the angle of the anode, however, the specification does not support that these steps are performed sequentially. Therefore, these limitations are deemed to be new matter.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1, 2, 4, 8-9, 12-16, 20-24, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dordi et al. '578 in view of Sendai et al.

Regarding claims 1 and 8, Dordi et al. '578 teach an electroplating method, comprising: loading a substrate into a receiving member (column 33 lines 33-47); tilting the receiving member to a first tilt angle measured from horizontal (column 34 lines 30-54); displacing the receiving member toward the fluid solution at the first tilt angle (i.e., α1, column 37, lines 35-58); tilting the receiving member to a second tilt angle (i.e., α2, column 37, lines 35-58) measured from horizontal when the substrate contacts the fluid solution, the second tilt angle being different from the first tilt angle; reducing the tilt angle to about horizontal (column 38 lines 41-44) and processing substrate at the horizontal processing angle. Since the processing angle is horizontal, it is different than the first and the second angles.

While Dordi et al. '578 teach positioning the substrate parallel to the surface of the anode in the horizontal position, Dordi et al. '578 does not explicitly disclose tilting the anode.

Sendai et al. teach an electroplating method wherein the tilt angle is greater than 0 degrees at a time when the substrate becomes completely immersed in the fluid solution (paragraph 25); the anode is tilted from horizontal at an angle of between about 1 and 10 degrees (paragraph 91); and the central axis of the substrate proximate is centered on the electrolyte solution (figures 11-12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dordi et al. '578 by tilting the substrate and the anode to the processing angle of Sendai et al., because tilting the anode would prevent air bubbles from remaining on the surface to be plated and would enhance plating uniformity (paragraph 96 of Sendai et al.).

Addressing claims 21 and 22, it would have been obvious to one having ordinary skill in the art at the time the invention was made to recognize that the intermediate position of the substrate would be parallel to the surface of the anode when the anode is tilted at an angle as taught by Sendai et al. while the tilt angle of the substrate is reduced to horizontal as disclosed by Dordi et al. '578, since the tilt angle of the substrate would overlap the angle of the anode.

Regarding claims 2 and 12, Dordi et al. '578 teach an electroplating method wherein the first tilt angle is between about 0 and 90 degrees (column 35 lines 41-48), which encompasses the range of the instant claim.

Regarding claim 13, Dordi et al. '578 teach an electroplating method wherein the tilt angle is reduced to horizontal (column 38 lines 41-57).

Regarding claims 4 and 9, Dordi et al. '578 teach an electroplating method wherein the receiving member is rotated at a rotation rate of between about 0 rpm and about 200 rpm (column 38 lines 62-67).

Addressing claim 14, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dordi et al. '578 by tilting the substrate when the substrate is completely immersed in the fluid solution as taught by Sendai et al., because it would prevent air bubbles from remaining on the surface to be plated and prevent plating film defects.

Regarding claim 15, Dordi et al. '578 teach an electroplating method, comprising: positioning the substrate on a contact ring (column 33 lines 33-47); securing the substrate to the contact ring with a thrust plate assembly (column 33 lines 33-47); tilting the contact ring to a tilt angle of between 0 and 90 degrees (column 35 lines 41-48), which is within the range of the instant claim; vertically actuating the contact ring toward the plating electrolyte while maintaining the tilt angle (column 34 lines 55-64); rotating the contact ring at a rotation rate of between about 0 rpm and about 200 rpm (column 38 lines 62-67); reducing the tilt angle to a second angle (i.e., α2, column 37, lines 35-58) when the contact ring initially touches the plating electrolyte; and positioning the substrate in a processing position (column 38 lines 41-57).

Dordi et al. '578 differs from the instant claims in that the reference teach positioning the substrate parallel to the surface of the anode in the horizontal position but does not explicitly disclose tilting the anode.

Sendai et al. teach an electroplating method wherein the tilt angle is greater than 0 degrees at a time when the substrate becomes completely immersed in the fluid solution (paragraph 25); the anode is tilted from horizontal at an angle of between about 1 and 10 degrees (paragraph 91); and the central axis of the substrate proximate is centered on the electrolyte solution (figures 11-12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dordi et al. '578 by tilting the anode as taught by Sendai et al., because tilting the anode would prevent air bubbles from remaining on the surface to be plated and would enhance plating uniformity.

Regarding claim 16, Dordi et al. '578 teach an electroplating method wherein the second tilt angle is horizontal or about 0 degrees (column 38 lines 41-57).

Addressing claim 20, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dordi et al. '578 by maintaining the central axis of the substrate proximately centered on the electrolyte solution as taught by Sendai et al., because it would enhance plating uniformity.

Regarding claim 23, Dordi et al. '578 teach an electroplating method, comprising: loading a substrate into a receiving member (column 33 lines 33-47); tilting the receiving member to a first tilt angle measured from horizontal (i.e., α1, column 37, lines

35-58); immersing the substrate into the plating solution (column 34 lines 55-64); and pivoting the receiving member from the first angle to an intermediate position to a second angle (i.e., α2, column 37, lines 35-58) while maintaining the substrate immersed in the plating solution (column 38 lines 24-26).

Dordi et al. '578 differs from the instant claims in that the reference teach positioning the substrate parallel to the surface of the anode in the horizontal position but does not explicitly disclose tilting the substrate to a third angle.

Sendai et al. teach an electroplating method wherein the tilt angle is greater than 0 degrees at a time when the substrate becomes completely immersed in the fluid solution (paragraph 25); the anode is tilted from horizontal at an angle of between about 1 and 10 degrees (paragraph 91); and the central axis of the substrate proximate is centered on the electrolyte solution (figures 11-12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dordi et al. '578 by tilting the substrate to a third angle as taught by Sendai et al., because tilting the substrate would prevent air bubbles from remaining on the surface to be plated, thus enhancing plating uniformity. It would have been obvious to one having ordinary skill in the art at the time the invention was made to recognize that the intermediate position of the substrate would be parallel to the surface of the anode when the anode is tilted at an angle as taught by Sendai et al. while the tilt angle of the substrate is reduced to horizontal as disclosed by Dordi et al. '578, since the tilt angle of the substrate would overlap the angle of the anode.

Addressing claim 24, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dordi et al. '578 by tilting the anode as taught by Sendai et al., because tilting the anode would prevent air bubbles from remaining on the surface to be plated and would enhance plating uniformity.

Regarding claim 26, Dordi et al. '578 vertically displacing the substrate while the substrate is immersing inside the plating solution (column 39 lines 12-16).

Claims 5, 6, 10 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dordi et al. '578 in view of Sendai et al., and further in view of Wang et al.

Dordi et al. '578 and Sendai et al. teach the method as described above. The difference between the reference to Dordi et al. '578 and the instant claims is that the reference does not explicitly teach oscillating the substrate.

Wang et al. teach that it is desirable "to vibrate the substrate, e.g., substantially vertically and/or horizontal [sic], relative to the electrolyte solution" (paragraph 81) in order to "enhance the fluid flow of the electrolyte solution into the features contained on the plating surfaces."

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dordi et al. '578 and Sendai et al. by vibrating or oscillating the substrate as taught by Wang et al., because it would enhance the fluid flow of the electrolyte solution into the features contained on the

plating surfaces, and because it would enhance the metal film deposition rate within the features.

Response to Arguments

Applicant's arguments filed have been fully considered but they are not persuasive. In the arguments presented on page 8 of the amendment, the applicant argues that when Dordi et al. is modified by Sendai et al. the substrate would not be horizontal after immersion because Dordi's tilting to a horizontal position for electroplating would be replaced by Sendai's tilting for plating. This argument is deemed to be unpersuasive, because Sendai is not relied on for the immersion process but rather performing the electroplating process at a tilted angle such that the processing angle of the substrate is parallel to the angle of the anode. Therefore, a skilled artistan would retain the immersion process of Dordi when modifying with Sendai. When the substrate is immersed as shown in Fig. 30-31 of Dordi and when the anode is at an angle as shown in Fig. 12 of Sendai, the angle of the substrate must necessarily cross the horizontal position from the initial tilted immersion angle of Dordi to the anode angle of Sendai. Therefore, the combination of Dordi in view of Sendai would encompass the limitations of the instant claims.

Conclusion

THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan V. Van whose telephone number is 571-272-8521. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Nam X Nguyen/

Supervisory Patent Examiner, Art Unit 1753

LVV
December 5, 2008